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Diseases, Insects, Pests

Alberta AGRICULTURE

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Blackleg of Canola

Virulent blackleg of canola/rapeseed is a fungal canker or dry rot disease of the actively growing crop that causes stem girdling and lodging. In heavily infested crops, up to 100 per cent of the stems may be infected, resulting in major yield loss.

Two types of blackleg fungus infect canola – avirulent and virulent. The avirulent or mild type has always been common in canola fields. The disease appears on leaves and stems in August but does not usually cause significant damage.

Virulent or severe blackleg infects canola seedlings and progressively damages the growing crop in June and July. It causes major crop loss by severely damaging or killing infected plants.

When blackleg spores come in contact with growing canola, they infect the living cells of the plant. Both types of blackleg cause dead patches that appear as pepper-like spots on canola leaves, pods and stems. The virulent strain infects canola from germination to maturity, while the avirulent strain is only really active on the ripening crop.

The extent of spread

Virulent blackleg was first detected in Alberta in 1983, and is now common in east-central Alberta. Crop losses of 20 to 50 per cent of the expected yield have occurred in fields not following recommended rotations. The disease has not been found in the Peace River region and is uncommon in western and southern areas of the province. In general, losses from blackleg in Alberta are minor.

The disease organism, *Leptosphaeria maculans*, occurs worldwide on canola/rapeseed crops. In the 1991 survey for virulent blackleg, field infestation levels ranged from zero to a high of 50 per cent in one east central municipality. No blackleg was found in all of the 620 pedigreed canola seed fields surveyed in 1991.

How the disease is spread

Blackleg is spread by infected seed or by spores that are splashed about by rain or carried by the wind in the growing crop. Long distance spread of the disease across the prairies is through the movement of infected seed.

When blackleg-infected seed is sown, the seedlings that emerge may be infected with lesions on the seedling leaves or stems. These infections can quickly form spores that remain infectious for only a few hours and are spread by rain to nearby healthy seedlings to start new infections. In a single season, one infected seedling could spread the infection to many surrounding plants. Thus, a canola crop planted from diseased seed could develop scattered areas of infection all over the field. These blackleg infected plants result in infected stubble that continues to produce infectious spores (pycnidiospores) for 3 to 5 years.

During the last couple of years in eastern Alberta, another kind of spore has appeared in infected stubble in a few fields along the Saskatchewan border. This spore (ascospore) results from two distinct strains of the virulent blackleg fungus mating. Both strains have to infect the same plants in order to hybridize and produce this sexual spore. Ascospores are very common in heavily infested regions of Saskatchewan. Infected canola stubble discharges thousands of these spores into the air from May until October. The spores are wind-borne and can travel several kilometres in the air before landing. If they land on canola or mustard plants in nearby fields, the spores can begin new infections and continue the disease cycle.

How the disease organism survives

The fungus overwinters primarily on canola stubble. The fungus can survive on all canola plant parts, particularly the stems and roots which resist breakdown in the soil. Canola stubble, especially larger stems, can take two or three years to break down and up to five years during a

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series of dry seasons. Therefore, infected stubble can continue to produce spores of the blackleg fungus until it is buried and rots in the soil. The heaviest spore production comes from two-year-old infected stubble.

Blackleg can survive crop rotations on volunteer canola. Wild mustards may harbor blackleg infestations.

How to prevent the introduction of virulent blackleg onto land

- Purchase seed that has been tested for blackleg. A laboratory certificate will be issued for all seed lots that were tested for virulent blackleg and shown to be negative for the disease.
- Treat all canola intended for planting with recommended fungicides and lindane.
  - Even if seed does test blackleg-negative, there could be a few infected seeds in the total seed lot. A fungicide treatment will decrease the chances of blackleg surviving on the seed. Fungicides effectively reduce seed-borne blackleg, but they do not guarantee a 100 per cent control. Do not treat below recommended rates.
  - A fungicide treatment minimizes the risk of blackleg contamination if blackleg-free seed was accidentally mixed with infected seed during cleaning operations.
  - Recommended treatments also provides protection against other soil-borne diseases and flea beetles.

Recommended fungicide mixtures include:

Benolin R	– benomyl:thiram:lindane – IPCO
Cloak	– carbathiin:thiram:lindane – Uniroyal Chemical/Gustafson
Premiere Flowable	– thiabendazole:thiram:lindane – Chipman Ltd.
Rovral ST Flowable	– iprodione:lindane – Rhône-Poulenc
Thiralin Plus	– benomyl:thiram:lindane – Rhône-Poulenc
Vitavax RS Flowable	– carbathiin:thiram:lindane – Uniroyal Chemical/Gustafson
Vitavax RS Powder	– carbathiin:thiram:lindane – Uniroyal Chemical/Gustafson

- Practise a proper crop rotation.
  - Do not grow canola on a field more frequently than once every four years. There is always a possibility that blackleg could be introduced to your land by wind-borne spores; longer rotations will increase the probability that low levels of disease infection will disappear when the infected stubble has rotted.
- Practise proper weed control, particularly volunteer canola.
  - Blackleg can live from one year to the next on volunteer canola and wild mustards. If you do not practise weed control and eliminate volunteer canola and mustards, a long crop rotation will be ineffective.

Control of blackleg on infested land

The following procedures must be adopted:

- Bury canola stubble as deeply as possible in the fall. Alternatively, where soil erosion is a problem, incorporate the canola stubble just before planting. This practice speeds stubble decomposition and reduces the disease infection potential in the field.
- In the following three seasons, use shallow tillage or direct seeding to avoid bringing infected canola residue to the surface. Additionally, plant non-host crops such as cereals, grasses, alfalfa, clover and pulses.
- If at all possible, avoid planting canola closer than one kilometre from infested land for three years.
- Keep infested land absolutely free of volunteer canola and any wild mustards. **Note:** You may have difficulty controlling volunteer canola in newly seeded alfalfa, clover and peas.
- Do not plant canola seed from infested land.

Accredited seed testing laboratories

Norwest Laboratories
9938 - 67 Avenue, Edmonton T6E OP5
Phone 438-5522

United Grain Growers Seed Division
P.O. Box 6030, Station C, Edmonton T5B 4K5
Phone 479-2051

Alberta Wheat Pool
4722 - 39 Street, Camrose T4V OZ5
Phone 672-5571

Alberta Wheat Pool
9728 - 128 Avenue, Grande Prairie, T8V 4J4
Phone: 532-8841

20/20 Seed Laboratories
Box 224, Nisku, TOG 2G0
Phone: 955-3435

Newfield Seeds Limited
P.O. Box 100, Nipawin, Saskatchewan SOE 1EO
Phone (306) 862-4678

Note: All laboratories follow a uniform seed testing procedure.

Blackleg resistance in licensed canola cultivars available in Alberta - 1992

Argentine	AC Excel	I
Brassica napus	AC Tristar	VS
	Altó	VS
	Bounty	S
	Celebra	I
	Delta	I
	Global	I
	Hyola 401	S
	HC 120	S
	Legend	I
	Profit	I
	Stallion	I
	Vanguard	I
	Westar	VS
New releases	ACS-N8	S
Limited or no	A0327	I
seed available	A0337*	R
	Cyclone*	R
	S85 1426	S
	SVO 2406	I

Polish	AC Parkland	S
Brassica campestris	Colt	S
	Eldorado	S
	Goldrush	S
	Horizon	S
	Reward	S
	Tobin	S

In regions with high incidences of blackleg, when canola follows canola the disease ratings are as follows:

Rating	**Percentage of stems infected**
Very susceptible - VS	90-100%
Susceptible - S	59-70%
Intermediate - I	50-69%
Resistant - R	30-49%

* Even though A0337 and Cyclone may qualify as resistant cultivars, severe yield losses of up to 50% can still occur in canola fields with considerable levels of infected stubble.

This information is based on the Western Canada Canola Co-operative tests used for varietal (cultivar) registration.

Photographic index for blackleg

The photographs appear on the following page.

1. Canola in full bloom.
2. Canola rosettes girdled by cankers – blackleg infection took place at the seedling stage.
3. Seedling with blackleg-infected cotyledon.
   - Infection could have been seed-borne or from infected stubble. The pepper-like spots produce infective spores throughout the growing season.
4. Mature leaf infection showing brown lesions (dead areas) with pepper-like, spore-producing areas.
5. Blackleg cankers on lower stems.
   - Cankers may be several inches in length and may partially or completely girdle stems.
6. Canola lodges in blackleg-infested fields, particularly at high levels of infection.
7. Lower stem canker showing spore-producing area and black edges around the infected area.
8. Close-up of overwintered canola stubble with an infectious blackleg canker.
9. Pepper-like, spore-producing structures are visible on the surface of the old infected canker. These infected stems produce infectious spores for several years when left on the soil surface.

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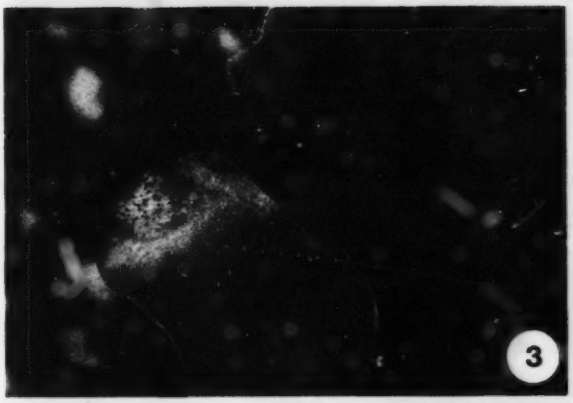
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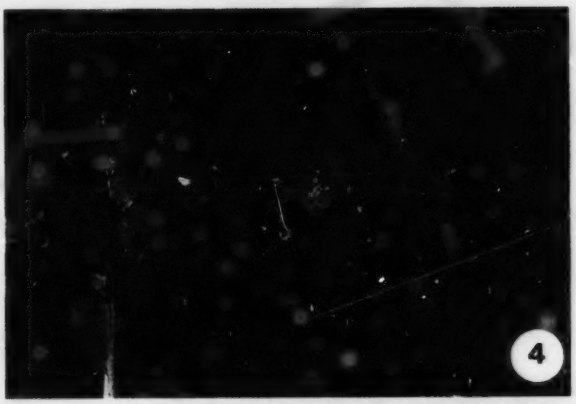
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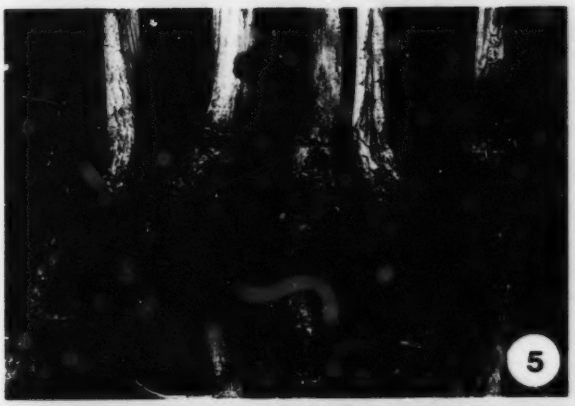
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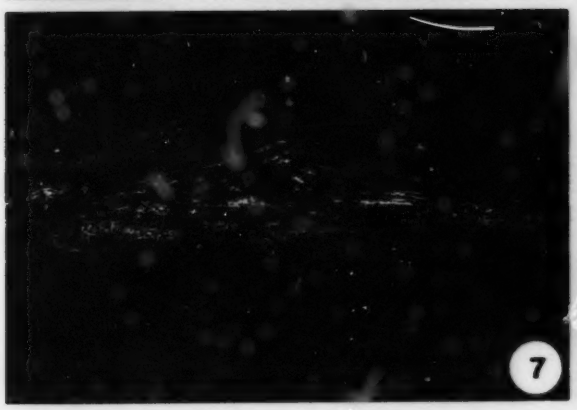
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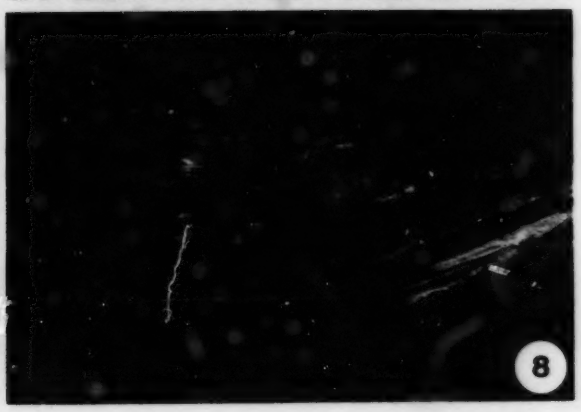
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